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RESEARCH MODEL

WING/TAIL FABRICATION

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The design and construction of a transonic wind-tunnel model has been completed. The 1/7.5-scale model can be equipped with an all-flying low-, mid-, or T-tail. A baseline, linear element wing and an alternate wing of identical planform, but with chordwise airfoil sections optimized for transonic cruise, have been manufactured. One row of pressures is located on each wing and on the horizontal tail.

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INTRODUCTION

The wind tunnel model design and construction reviewed in this report was sponsored under Contract No. N00014-81-C-0680 and executed by General Dynamics corporation. The contracted activity spans the period from 17 August 1981 through 18 January 1982.

The program activities were monitored by Dr. Robert E. Whitehead of ONR. The program was managed by Ronald A. Cox of the Fort Worth Division. Clyde Wilkerson was responsible for the design of the wind tunnel model and was the liaison with the model shop.

MODEL DESCRIPTION

General Dynamics has completed the design and construction of a transonic wind tunnel model to be used in experiments to be conducted in the NASA/Ames Research Center 14-Foot Transonic Tunnel. The effort was in accordance with Phase I of the General Dynamics Proposal No. 81-P-0520 (Technical Proposal FZP-2081). Photographs of the model are shown in Figures 1 and 2.

The 1/7.5-scale model (designated configuration 603E) can be equipped with an all-flying low-, mid-, or T-tail at deflections of -10, 0, or +10 deg. See Figure 3. The horizontal tail has one row of 30 pressure taps (15 upper-port, 15 lower-starboard) at a non-dimensional exposed span station of $\eta = 0.63$. These pressures have been moved inboard from the originally specified station of $\eta = 0.75$ because of an elevator hinge located at the initial location.

For the mid- and T-tail configurations, the pressure lines are routed through the vertical tail; the low-tail pressure lines through the nacelle/aft fuselage.

A baseline, linear element wing and an alternate wing of identical planform, but with chordwise airfoil sections optimized for transonic cruise, have been manufactured. The baseline (steel) wing and the alternate (aluminum) wing are interchangeable on the model.

Each of the two model wings have one row of pressure taps located at $\eta = 0.545$. The wing pressure tap locations have been changed from the initially specified value of 15 upper-port/10 lower-starboard to 17 upper/8 lower in order to better capture the wing upper surface shock location.

The pressure scanivalves will be housed in the model nose. Three static pressure orifices are located in the sting-cavity area.

The planned run schedule for the transonic wind-tunnel test is listed in Table 1.

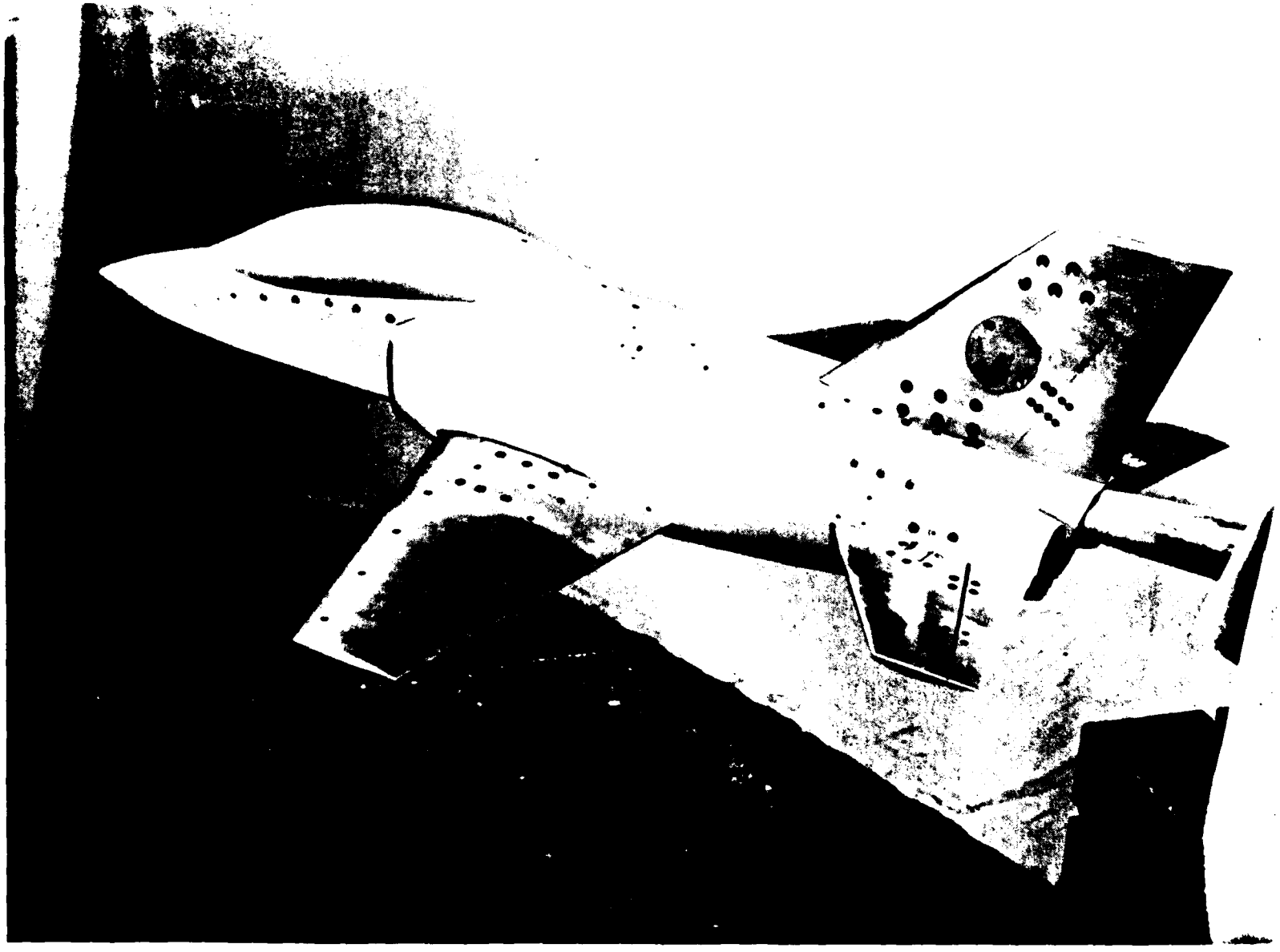

Figure 1. Configuration 603E Wind-Tunnel Model

Figure 2. Configuration 603E Wind-Tunnel Model

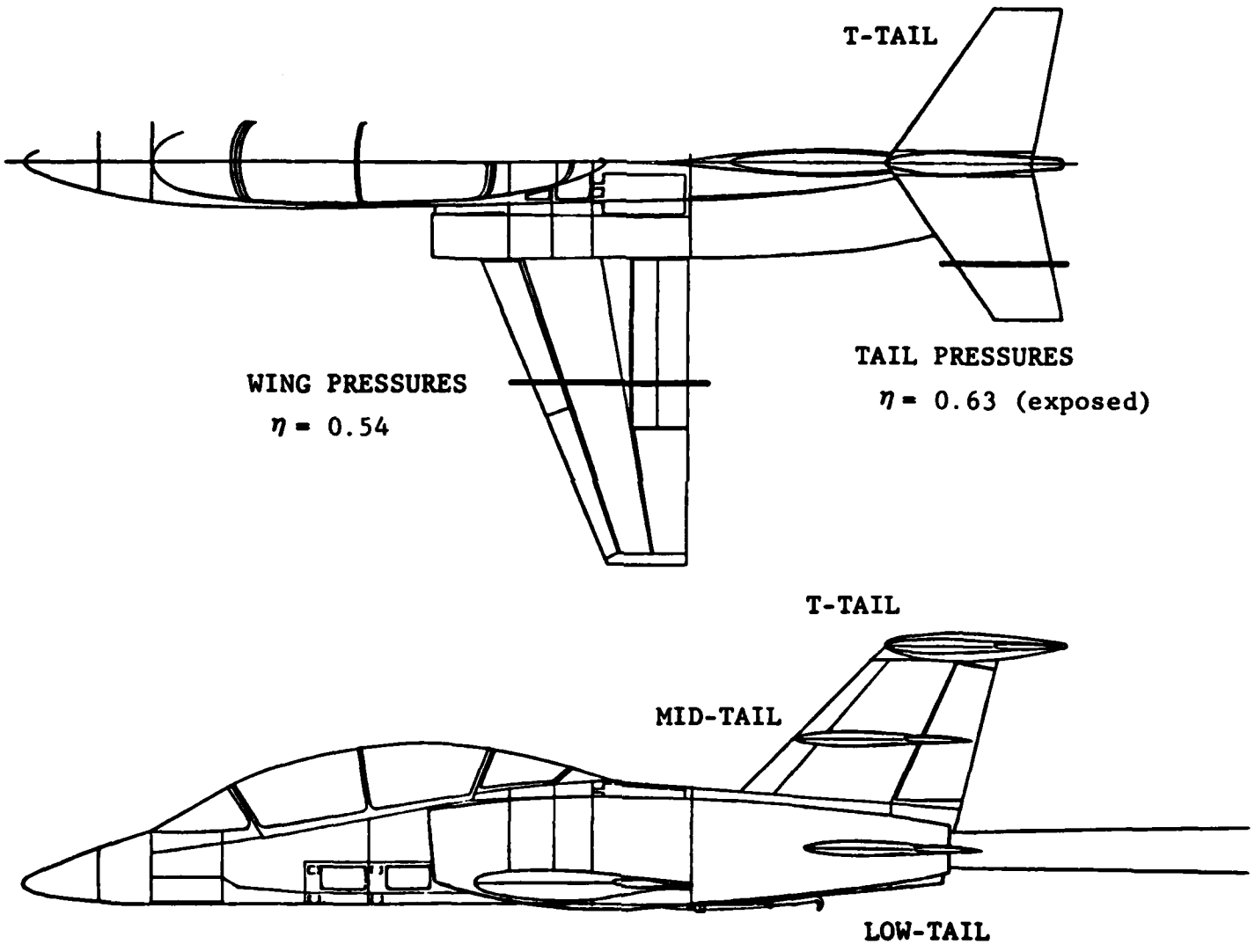

Figure 3. Configuration 603E Tail and Pressure Row Locations

CONFIGURATION NUMBER	CONFIGURATION	α SCHEDULE	$\delta_{HORIZ.}$	MACH NUMBER .60	.70	.75	.78	.80	.82	.85	.90	.95	REMARKS
▷ 1	ALTERNATE WING (AW)	B	-10^{o}	X			X			X			PRESSURE DATA
▷ 2	+ LOW TAIL		0^{o}	X			X			X			
▷ 3	+ LOW TAIL		$+10^{o}$	X			X			X			
4	AW + MID TAIL		0^{o}	X			X			X			
5	AW + T-TAIL		0^{o}	X			X			X			
▷ 6	AW W/O TAIL	A	OFF	X	X	X	X	X	X	X	X	X	
▷ 7	BASIC 603E	B	-10^{o}	X			X			X			
▷ 8	+ LOW TAIL		0^{o}	X			X			X			
▷ 9	+ LOW TAIL		$+10^{o}$	X			X			X			
10	+ MID TAIL		0^{o}	X			X			X			
11	+ MID TAIL		-10^{o}	X			X			X			
12	+ T-TAIL		0^{o}	X			X			X			
13	+ T-TAIL		-10^{o}	X			X			X			
▷ 14	603E W/O TAIL	A	OFF	X	X	X	X	X	X	X	X	X	
▷ 15	603E W/O TAIL		OFF	X	X	X	X	X	X	X	X	X	FORCE DATA
▷ 16	603E W/O TAIL		OFF	X	X	X	X	X	X	X	X	X	(Inverted)
▷ 17	603E + LOW TAIL	B	-10^{o}	X			X			X			
▷ 18	603E + LOW TAIL		0^{o}	X			X			X			
▷ 19	603E + LOW TAIL		$+10^{o}$	X			X			X			
20	603E + MID TAIL		0^{o}	X			X			X			
21	603E + MID TAIL		-10^{o}	X			X			X			
22	603E + T-TAIL		0^{o}	X			X			X			
23	603E + T-TAIL		-10^{o}	X			X			X			
24	AW + T-TAIL		0^{o}	X			X			X			
25	AW + MID TAIL		0^{o}	X			X			X			
▷ 26	AW + LOW TAIL		-10^{o}	X			X			X			
▷ 27	AW + LOW TAIL		0^{o}	X			X			X			
▷ 28	AW + LOW TAIL		$+10^{o}$	X			X			X			
▷ 29	AW W/O TAIL	A	OFF	X	X	X	X	X	X	X	X	X	

α SCHEDULE: A = -4^{o}, -3^{o}, -2^{o}, ...10^{o}, 2^{o} INCREMENT TO MAX α; B = -4^{o}, -2^{o}, 0^{o}, ...,2^{o} INCREMENT TO MAX α.

Table 1. Run Schedule

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